

Amendment and Response

Applicant: Daniel Lyle Callahan et al.

Serial No.: 10/615,011

Filed: July 8, 2003

Docket No.: 200308561-1

Title: FORCE DISTRIBUTING SPRING ELEMENT

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IN THE CLAIMS

Please cancel claims 5, 8-9, and 17-18 without prejudice.

Please add claims 23-24.

Please amend claims 3-4, 6-7, 11-12, 16, and 19 as follows:

1-2. (Canceled)

3. (Currently Amended) An electronic component system comprising:

a land grid array module;

a printed circuit board having a first side and a second side;

an interposer disposed between the land grid array module and the first side of the printed circuit board;a backing plate ~~spaced from, and~~ disposed on the second side of the printed circuit board opposite the first side of the printed circuit board and spaced from the second side of the printed circuit board;

a plurality of posts extending through and connecting the module, the printed circuit board, the interposer, and the backing plate relative to each other; and

a curved spring member disposed between the backing plate and the second side of the printed circuit board, with a convexity of the curved spring member facing the second side of the printed circuit board and the curved spring member including:a first outer portion in ~~secured~~ contact with the backing plate and spaced from the second side of the printed circuit board in an assembled state of the system, the first outer portion slidably mounted on each of the respective posts; anda second central inner portion in unsecured, direct pressing contact against the second side of the printed circuit board adjacent at a center of the printed circuit board and biased to exert a compressive force against the center of the printed circuit board,wherein the curved spring member retains a generally curved shape in ~~both an unassembled state of the system and in an~~ the assembled state of the system.4. (Currently Amended) The system of claim 3 wherein the second central inner portion of the curved spring member comprises a ~~central~~ body portion and the first inner portion of

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the curved spring member comprises a plurality of leg members radially extending outward from the ~~central~~ body portion with an end of each leg member including a hole configured for slidable mounting relative to one of the respective posts to enable maintaining contact of ~~secure the curved spring member against relative to~~ the backing plate.

5. (Canceled)

6. (Currently Amended) The system of claim ~~54~~ wherein the curved spring member includes the hole of each leg member having an elongate shape configured to facilitate permit limited sliding movement of each leg of the curved spring member relative to each of the posts.

7. (Currently Amended) The system of claim ~~36~~ wherein the ~~central~~ body portion of the curved spring member defines a body of material formed without holes.

8-9. (Canceled)

10. (Previously Presented) The system of claim 3 wherein the curved spring member is a single member that provides the substantially all of the compressive clamping force on the system.

11. (Currently Amended) A force distributing mechanism comprising:
means for securing a land grid array module and a printed circuit board in electrical communication with each other including introducing a contact force between an array of contact elements of the land grid array module and an array of contact elements of the printed circuit board; and

means for maintaining and distributing the contact force substantially uniformly across the contact array of the land grid array module and the contact array of the printed circuit board, wherein in an assembled state of the land grid array module and the printed circuit board, the means for maintaining and distributing the contact force is in direct contact with a second side of the printed circuit board adjacent ~~at~~ a center portion of the printed circuit

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board relative to the land grid array module and is spaced from the second side of the printed circuit board adjacent at an outer portion of the printed circuit board relative to the land grid array module.

12. (Currently Amended) The mechanism of claim 11 wherein the means for securing comprises ~~at least one of~~:

an interposer disposed between the land grid array module and the printed circuit board;

a plurality of load posts extending through each of the land grid array module, the printed circuit board, the interposer, and the means for maintaining and distributing the contact force; and

a stiffening plate disposed on a side of the printed circuit board opposite the interposer and the land grid array module, and fixed to the load posts to be spaced from the printed circuit board.

13. (Previously Presented) The mechanism of claim 12 wherein the means for maintaining and distributing comprises:

a spring member disposed between the printed circuit board and the stiffening plate and having a first portion in contact with the backing plate and a second portion in pressing contact against the printed circuit board, wherein the spring member has a curved shape arranged to forcibly press against the center portion of the printed circuit board relative to the land grid array module.

14. (Original) The mechanism of claim 13 wherein the second portion of the spring member comprises a central body portion and the first portion comprises a plurality of legs extending radially outward from the central body portion, with each leg having an end with a hole configured for receiving one of the load posts and the end configured for contact against the stiffening plate adjacent the load posts at each of a plurality of corners of the stiffening plate.

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15. (Original) The mechanism of claim 12 wherein the means for securing a module comprises:

a plurality of load springs carried on the load posts and configured and positioned for exerting a compressive force on the land grid array module, the interposer, and the printed circuit board.

16. (Currently Amended) A method of distributing a contact force between a land grid array module and a printed circuit board, the method comprising:

securing the land grid array module to a first side of the printed circuit board via an interposer disposed on the first side of the printed circuit board and via a backing plate disposed on, and spaced from, a second side of the printed circuit board;

extending at least one load post through each one of four corners of the land grid array module, the interposer, the printed circuit board, and the backing plate;

introducing, with a load spring mounted on each one of the load posts, a compressive force between the land grid array module, the interposer, and the printed circuit board; and

biasing a curved spring member between the backing plate and the second side of the printed circuit board to insure a substantially uniform contact force across the land grid array module, the interposer, and the printed circuit board via;

positioning wherein a first outer portion of the curved spring member is in secured contact with the backing plate and the first portion of the spring member is to be spaced from the second side of the printed circuit board in an assembled state of the land grid array module, the printed circuit board, and the curved spring member, including slidably mounting the first outer portion of the curved spring member onto each respective load post; and wherein,

positioning a convexity of a second central inner portion of the curved spring member toward the second side of the printed circuit board and maintaining the second central inner portion of the curved spring member biased in unsecured, pressing direct contact against a central portion of the second side of the printed circuit board,

wherein the curved spring member retains a generally curved shape in both an ~~unassembled state of the system and in~~ the assembled state of the system.

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17-18. (Canceled)

19. (Currently Amended) The method of claim 16 wherein biasing the spring member comprises:

using the curved spring member to provide substantially all of a compressive force exerted on the land grid array module, the interposer, and the printed circuit board.

20. (Previously Presented) An electronic component system comprising:

a land grid array module;

a printed circuit board having a first side and a second side;

an interposer disposed between the module and the first side of the printed circuit board;

a backing plate spaced from, and disposed on the second side of the printed circuit board opposite the first side;

a plurality of posts extending through and connecting each of module, the printed circuit board, the interposer, and the backing plate relative to each other; and

a curved spring member disposed between the backing plate and the second side of the printed circuit board, and having a first portion in secured contact with the backing plate and a second portion in unsecured, pressing contact against the second side of the printed circuit board adjacent a center of the printed circuit board,

wherein the second portion of the spring member comprises a curved central body portion and wherein the backing plate includes a recessed portion defined in a main body of the backing plate that is configured to receive the first portion of the spring member.

21. (Previously Presented) The system of claim 20 wherein the recessed portion of the backing plate has a width less than a width of the main body of the backing plate and has a length less than a length of the main body of the backing plate, and the curved spring member is sized and shaped to be removably secured within the recessed portion of the backing plate.

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22. (Previously Presented) A method of distributing a contact force between a land grid array module and a printed circuit board, the method comprising:

securing the land grid array module to a first side of the printed circuit board via an interposer disposed on the first side of the printed circuit board and via a backing plate disposed on, and spaced from, a second side of the printed circuit board; and

biasing a curved spring member between the backing plate and the second side of the printed circuit board to insure a substantially uniform contact force across the module, the interposer, and the printed circuit board wherein a first portion of spring member is removably secured within a recess of the backing plate and a second portion of the spring member is biased in unsecured, pressing direct contact against the second side of the printed circuit board.

23. (New) The method of claim 22 wherein securing the land grid array comprises:

extending at least one load post through each one of four corners of the land grid array module, the interposer, the printed circuit board, and the backing plate; and

introducing, with a load spring mounted on each one of the load posts, a compressive force between the land grid array module, the interposer, and the printed circuit board.

24. (New) The method of claim 22 wherein biasing the spring member comprises:

using the spring member to provide substantially all of a compressive force exerted on the land grid array module, the interposer, and the printed circuit board.